PG CBCS M.SC.Semester-II Examination, 2021 (Mathematics) PAPER: C-MTM-204 (STATISTICAL AND NUMERICAL METHODS)

Full Marks: 40

Time: 2 Hours

Answer any FOUR	questions from the following:	4×10=40
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1. (a) The values of function f(x) are given for certain values of x:

x:05101520f(x):1.01.63.88.215.4

Construct the difference table and estimate the value of f (21) by Newton's Backward Formula.

(b) The values of function f(x) are given for certain values of x:

<i>x</i> :	0	1	2	3
f(x):	1	2	11	34

Find f(x) assuming it to be a polynomial of degree three in x. 5+5

2. (a) Find the value of $\int_{0}^{1} (4x-3x^2) dx$ by Trapezoidal rule, taking 10 equal

subintervals.

(b) Evaluate $\int_{0}^{0.6} e^x dx$ by Simpson's 1/3 rule, taking 6 equal subintervals.

5 + 5

3. (a) If $f(x) = 4 - 6x + \sin^2 x$, find the relative percentage error in f(x) for x = 0 when error in x is 0.004.

(b) Compute *y* (0.4), from the equation $\frac{dy}{dx} = x y$, *y*(0) = 2, taking step length *h* = 0.2, by Runge-Kutta method, correct up to four decimal places.

(c) Find the median of 33, 86, 68, 32, 80, 48, 70, 64. 2+6+2

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4. (a) Solve the system of equations by Gauss-elimination method:

$$2x_1 + x_2 + x_3 = 4$$
$$x_1 - x_2 + 2x_3 = 2$$
$$2x_1 + 2x_2 - x_3 = 3$$

(b) Solve the equation $x^3 - 9x + 1 = 0$ by method of bisection for the root lying between 2 and 3, correct up to 3-significant figures. 5+5

5. (a) Describes Newton-Raphson method to find a real root of the equation f(x) = 0, where f(x) is continuous function of x. Write the convergence criteria of this method.
(b) Deduce the equation of regression lines for a set of *n* bivariate data.

5+5

6. (a) Find y (0.8), from the equation $\frac{dy}{dx} = -\frac{y}{1+x}$, y(0.3) = 2, taking step length h =

0.1, by Euler's method, correct up to four decimal places.

(b) Solve the system of equations by Crammer's rule:

$$x_1 + x_2 + x_3 = 2$$

$$2x_1 + x_2 - x_3 = 5$$

$$x_1 + 3x_2 + 2x_3 = 5$$

$$5+5$$

7. The heights (cm) of 25 male and 20 female college students are presented in the following table.

Males (X_1)	Females (X_2)
163	164
165	155
170	160
162	154
160	160
165	153
170	159
165	166
164	163
181	166
169	163

[P.T.O]

161	165
162	167
165	164
163	162
168	160
169	159
164	167
180	157
160	158
160	
167	
174	
168	
165	

Critical value: 2.017 at 0.05 level of significance

2.416 at 0.02 level of significance

2.695 at 0.01 level of significance

3.532 at 0.001 level of significance

Find if there is a significance difference between the mean heights of male and female college students using t-test.

8. Compute correlation co-efficient, regression co-efficient between the advertisement costs (x) and sales (y) as per data given below and also find the lines of regression.

					10					
Advertisement costs in thousand	39	65	62	90	82	75	25	98	36	78
Rs. (<i>x</i>)										
Sales in Lakhs Rs. (y)	47	53	58	86	62	68	60	91	51	84